

Amendments to the Drawings

The attached two (2) sheets of drawings include changes to FIGS. 12A-12C and 13A-13C. These sheets, which include FIGS. 12A-12C and 13A-13C, replace the original sheet including FIGS. 12A-13C. The previously omitted label "Prior Art" has been added to the figures.

Attachment: Two Replacement Sheets
Annotated Sheet Showing Changes

Remarks

Applicants have received and carefully reviewed the Office Action mailed May 15, 2006. Claim 11 has been canceled, claims 4, 6, 9, 22, 28-32, 34, and 35 have been amended, and new claims 41-44 have been added. Support for the amendments is found in the specification, claims, and drawings as originally filed. No new matter has been added. Reconsideration and allowance of the pending claims are respectfully requested.

Information Disclosure Statement

The Examiner indicated that the non-patent references listed on the information disclosure statement filed January 23, 2004 were not considered because copies were not provided. Applicants submit that copies were provided, as indicated on the post card filed with the IDS, a copy of which is attached. Additional copies of the references are attached to this response and the Examiner is requested to consider the references and initial the copy of the 1449, which is also attached. Because the references were provided with the original IDS, but appear to have been misplaced, Applicants submit that no fee is required.

Drawings

The Examiner has objected to the drawings because Figures 12A-12C and 13A-13C should be designated as "Prior Art." The drawings have been amended accordingly.

Objection to the Specification

The specification has been amended to update the references to related applications and federally sponsored research.

Claim Objections

Claims 4 and 6 are objected to for various formalities. The claims have been amended as suggested by the Examiner. Withdrawal of the objections is respectfully requested.

Rejection under 35 U.S.C. § 112, second paragraph

Claims 34 and 35 are rejected as being indefinite for lacking antecedent basis. The claims have been amended to provide the necessary antecedent basis. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejections under 35 U.S.C. § 102(b) and (e)

Claims 4 and 5 are rejected as being anticipated by Li (US 3,585,714). Independent claim 4, as amended, recites

4. (Currently Amended) A method for making an object having at least one surface comprising the steps of:
- forming a plurality of part layers such that inter-layer regions are defined therebetween, such that said inter-layer regions intersect said surface, said forming step including a layered manufacturing method to deposit a first flowable material to form said part layer; and
 - creating convex regions where said inter-layer regions intersect said surface.

Li does not appear to teach such a method. Li appears to teach a "device may be made by choosing a pn junction in a semiconductor wafer material prepared in the usual manner, and selectively grinding or polishing the wafer surface until the junction region is reached and/or passed" and "[t]he grinding or polishing operation is to be referred to as a 'grooving' operation; and the resultant depression, or cylindrically concave surface, as a 'groove'." Emphasis added; see column 3, line 53-56 and line 74 through column 4, line 2. Li also states, "[a]n example of interconnection between components by grooving and wire bonding is shown as W-W' in FIG. 7." See column 10, lines 73-75 and FIG. 7. Li thus appear to teach a device in which a cylindrical groove is ground out or polished into a semiconductor wafer. Li do not appear to teach a method involving layered manufacturing to deposit a first flowable material to form a part layer, as is recited in amended claim 4. Li thus do not appear to teach each and every element of independent claim 4 or the claims dependent thereon. Additionally, there is no motivation for one of ordinary skill in the art to modify Li to achieve the claimed methods. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 4-17 are rejected as being anticipated by Andre (US 5,976,339). Independent claim 4 recites the method steps of forming a plurality of part layers such that inter-layer regions are defined therebetween, and creating convex regions where the inter-layer regions intersect the surface. Independent claim 9, as amended, recites the steps of forming a second material layer having external convex edges and forming a first material layer having external concave edge impressions adjacent to the second material layer convex edges. Andre does not appear to teach or suggest such method steps.

The Examiner acknowledges that Andre does not disclose a layered manufacturing method employing beads/droplets forming convex surfaces within the layers, but asserts that it is an inherent property in Andre's method that the mold material (element 33), applied in bead/droplet form, would form a convex surface within the mold layer. The Examiner also refers to the instant specification, in particular FIGS. 3 and 5, elements 92 and 94, as acknowledging that layered manufacturing methods employing beads/droplets form convex surfaces within the layers.

Applicants wish to point out that only FIG. 3 of the instant specification illustrates the prior art layered manufacturing process that produces concave regions 62 between the layers. FIG. 5 of the instant specification illustrates an embodiment of the invention in which convex regions (e.g. element 104 in FIG. 6) between the layers are formed. Applicants submit that the Examiner's reliance on FIG. 5 of the instant specification is clearly improper because the figure shows an illustrative embodiment of the invention, not the prior art. Thus, any inherent properties of the mold material 33 of Andre would appear to be that of having concave inter-layer regions, based on the prior art shown in FIG. 3 of the instant specification. However, Andre specifically teaches:

Incremental layer of mold material 33 is selectively interrupted, wherein one of more interruptions 35 in layer 33 define the various x and y dimensional boundaries of object 21. Thus, mold layer 33 and the interruption(s) define a negative of the part or object to be fabricated.

Emphasis added; see column 4, lines 37-41 and FIG. 1. Andre also teaches "sidewalls defined by interruption 35." See column 6, line 67 through column 7, line 1. Thus, Andre appears to teach forming interruptions 35 in the form of substantially flat sidewalls in the mold material 33. Applicants submit that one of ordinary skill in the art, upon reading

Andre, would understand the mold material 33 to have specific shaped walls, as illustrated in the figures, or to inherently have concave inter-layer regions, as indicated by the prior art discussion in the instant specification. Andre does not, however, appear to provide any teaching or suggestion that the mold material 33 and object material 37 are applied such that convex inter-layer regions are formed, as is recited in independent claim 4. Similarly, Andre does not appear to teach or suggest the steps of forming a second material layer having external convex edges and forming a first material layer having external concave edge impressions adjacent to the second material layer convex edges, as is recited in independent claim 9.

Additionally, the teachings of Andre do not appear to satisfy the requirement for showing inherency. MPEP 2112 IV. states:

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)

(Emphasis added). Applicants submit that the claimed method steps of forming external convex edges in the second material layer and concave edge impressions adjacent to the second material layer convex edges in the first material layer are not necessarily present in Andre. It appears the Examiner is asserting that the claimed method steps could be performed by Andre, which is not a proper basis for rejection.

Further, the Examiner asserts that the layered product, still contained within the mold, as shown in FIGS. 3A-3C of Andre are indistinguishable from the layered product, still contained within the mold, shown in FIG. 5 of the instant disclosure, and further, that once the mold is removed from the product, the product formed by Andre is indistinguishable from the product shown in FIG. 6 of the instant disclosure, containing convex inter-

layer/between layer regions and concave intra-layer/within layer regions. Applicants respectfully disagree. FIGS. 3A-3C of Andre clearly show the intersection of mold layer 33 and object material 37 as a substantially flat wall, created by the interruption 35 formed in mold layer 33. Andre specifically teaches "one or more interruptions 35 in layer 33 define the various x and y dimensional boundaries of object 21." See column 4, lines 38-40. Andre thus appears to teach forming the interruptions 35 in mold layer 33 according to the desired shape of the object to be formed. FIG. 5 of the instant disclosure, however, shows second material 92, 94 having external convex edges and main material 97 having external concave edge impressions adjacent the second material convex edges. The layered products shown in FIGS. 3A-3C of Andre and FIG. 5 of the instant disclosure are thus clearly different.

Further, once the mold is removed, the object 21 of Andre, shown in FIG. 2 appears to have substantially flat columns 25 connecting the end pieces 23. The outer edges of object 21 thus appear to be flat or smooth. The object 90 shown in FIG. 6 of the instant disclosure, on the other hand, clearly has concave regions in the intra-layer regions and convex regions in the inter-layer regions. The objects shown in Andre and FIG. 6 of the instant disclosure are thus clearly different. If this rejection is maintained, Applicants request that the Examiner point out specifically how the layered product and object of Andre is being considered indistinguishable from the layered product and object shown in, for example, FIGS. 5-6 of the instant disclosure.

Andre thus does not appear to teach or suggest each and every element of independent claims 4 or 9 or the claims dependent thereon. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 22, 26, 34, and 35 are rejected as being anticipated by Masters (US 5,216,616). Independent claim 22, as amended, recites, in part, the steps of building first and second structures by forming layers of first and second materials, wherein at least a portion of the second structure has a sloping side face having a plurality of indented layers indented less than or equal to about one-half a bead width. Masters does not appear to teach or suggest such method steps. Masters appears to teach providing a column 76, web 80, or encapsulating support environment 90 to support an object being formed. See FIGS. 6-8. Masters thus does not appear to teach or suggest each and every element of independent

claim 22 or the claims dependent thereon. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 22, 26, 27, and 33 are rejected as being anticipated by Layden et al. (US 6,660,209). Independent claim 22 has been amended to include elements similar to those in original claim 32. Layden et al. do not appear to teach such method steps, as evidenced by the fact that the Examiner did not include original claim 32 in the anticipation rejection. The differences between Layden et al. and the claims, as amended, are further discussed below in the obviousness rejection. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejections under 35 U.S.C. § 103(a)

Claims 23-25 are rejected as being unpatentable over Masters. Masters does not appear to teach or suggest the basic elements of independent claim 22, from which claims 23-25 depend. Further, there is no motivation for one of ordinary skill in the art to modify the method of Masters to achieve the method as claimed. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 23-25 and 28-32 are rejected as being unpatentable over Layden et al. With regard to claim 32, the Examiner acknowledges that Layden et al. fails to teach that a sloping side face/indented layers of the second/support structure is formed of beads indented between $\frac{1}{2}$ a bead width and $\frac{1}{10}$ a bead width. The Examiner then asserts that Layden et al. teach forming a sloping side face of beads/drops and teaches that variations of the support structure can be readily employed by one of ordinary skill, and that it would have been obvious to create a support structure that is operative as a support structure. The Examiner has not, however, provided any reasoning as to why one of ordinary skill in the art would be motivated to modify the method of Layden et al. to achieve the specific indentation recited in the claims.

MPEP 2143.01 III states, "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)... Although a prior art device 'may be capable of being modified to run the way the

apparatus is claimed, there must be a suggestion or motivation in the reference to do so.' 916 F.2d at 682, 16 USPQ2d at 1432.)." Applicants submit that the Examiner has not provided any motivation to modify Layden et al. other than "to create a support structure that is operative as a support structure." Layden et al. already provides what appears to be a suitable support structure for their manufacturing methods, thus there is no motivation for one of ordinary skill in the art to modify the methods to achieve the claimed specific method steps. MPEP 2143.01 further cites *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) for stating that the "level of skill in the art cannot be relied upon to provide the suggestion to combine references." If the rejection is maintained, Applicants respectfully request the Examiner provide detailed reasoning as to why one of ordinary skill in the art would have been motivated to make the specific modifications to Layden et al. in order to achieve the specific method steps recited in independent claim 22 and the claims dependent thereon.

Finally, new independent claim 41 recites:

41. (New) A method for making a part of a first material, the part having a cavity with a bottom, a first volume, and a first structure disposed over the cavity, the method comprising the steps of:
building at least a portion of the first structure;
building a second structure of a second material having a second volume within the cavity to support the first structure during the building of the first structure, wherein the second structure building step forms said second structure abutting the first structure along an interior wall of the cavity, wherein the second structure does not extend to the bottom of the cavity.

Nothing in the cited art appears to teach, disclose or suggest a second structure that abuts the first structure along an interior wall of the cavity, and wherein the second structure does not extend to the bottom of the cavity. For these and other reasons, new claim 41 and dependent claim 42 are believed to be in condition for allowance.

New independent claim 43 recites:

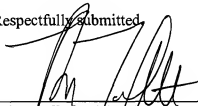
43. (New) A method for making a part of a first material, the part having a cavity with a first volume, at least one interior wall, and a first structure disposed over the cavity, the method comprising the steps of:
supporting the first structure during the building of the first structure by building a second structure of a second material having a second volume within the cavity to support the first structure; and

building the first structure over the second structure, wherein the second structure building step forms said second structure attached to said first structure along at least one interior wall of the cavity.

Nothing in the cited art appears to teach, disclose or suggest a second structure building step that forms a second structure that is attached to said first structure along at least one interior wall of the cavity. For these and other reasons, new claim 43 and dependent claim 44 are believed to be in condition for allowance.

For at least the reasons set forth above, all pending claims are believed to be in condition for allowance. Reconsideration and reexamination are respectfully requested. If a telephone interview would be of assistance, please contact the undersigned attorney.

Respectfully submitted,



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